ECE440: Homework #6

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Due: 07 May 2020

1. **Review Question R2, Chapter 6 (30%)**

   If all the links in the Internet were to provide reliable delivery service, would the TCP reliable delivery service be redundant? Why or why not?

   No, the TCP reliable delivery service would not be redundant. Even though a link-layer protocol may provide reliable delivery service, and thereby provide bit-level error detection and correction, this only guarantees that the datagram will move across the link without error. It does not affect anything outside the link. For example, data could travel through the link fine, but arrive out of order.

2. **Review Question R3, Chapter 6 (30%)**

   What are some of the possible services that a link-layer protocol can offer to the network layer? Which of these link-layer services have corresponding services in IP? In TCP?

   Possible services that can be offered to the network layer by a link-layer protocol include:

   - Framing,
   - Link access,
   - Reliable delivery, and
   - Error detection & correction.

   Of these, framing, link access, and error detection & correction have corresponding services in IP. All four of these services have corresponding services in TCP (as discussed in our first question).

3. **Review Question R4, Chapter 6 (40%)**

   Suppose two nodes start to transmit at the same time a packet of length L over a broadcast channel of rate R. Denote the propagation delay between the two nodes as d_{prop}. Will there be a collision if $d_{prop} < \frac{L}{R}$? Why or why not?

   If $d_{prop} < \frac{L}{R}$ and the bits transmit at the same time then there will of course be collision as neither bit can propagate through the link before the other and both bits will be in the link at the same time, causing collision.